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*175 under the Ch'ing emperors, reasserted its sway in Turkestan.
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4. Pattern of nomadic expansion and contraction

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175 Wave after wave of nomadic peoples have made their appear-
648 ances and then faded away, leaving the imprint of their stay on the palimpsest of Turkestan. The pattern of their entry, their ascendency, and their exit have been similar. Each outburst and withdrawal of the nomads showed but variations on the major theme. The Huns, the Turks, and the Mongols, to mention a few of the more powerful of the plethora of nomadic peoples, all had their geneses in the same region, an area of Mongolia south of Lake Baikal. The process of their rise to power followed parallel lines. First, there was a bitter internecine struggle from which one group emerged triumphant. Second, the nomadic tribes were unified into a strong coalition under the leadership of the dominant group. Third, they expanded outward from the steppes into neighboring regions, especially into the marginal zone of modern Sinkiang and Inner Mongolia. Then they consolidated these areas into bases of operation for the fourth stage, the invasion and, when successful, the conquest of the opulent agrarian lands. At the peak of their strength, these nomadic invaders would establish a strong, militant empire, under an absolutist government, to control the motley subject peoples under their domination.

But once they reached the peak of their power, the downgrade began. The paucity of their numerical strength made it difficult for them to hold large territories. The tradition of intertribal contest instilled the spirit of independence in the minds of the satraps appointed to rule portions of the far-flung empires. The failure to resolve the incompatibility between pastoral and agrarian economy, and the resentment and rebellious tendency of the subject peoples whom the conquerers were only able to overawe by military strength, were all factors which brought about the disintegration and decline of the empires of the nomads.

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175 5. Theories concerning nomadic eruptions
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648 What accounted for the sudden irresistible ferocity of nomad eruptions and what accounted for the docility of their withdrawal? A number of very ingenious theorires have been advanced, as answers to this intriguing question, but so far these are still in the realm of assumptions.

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175 Many scholars have regarded the influence of climate as a
121 possible cause of the high tide and ebb of nomadic activities.
648 Superimposed on the progressive dessication of Central Asia
● 132 resulting from the withdrawal of glaciers, were the minor cyclic
114 fluctuations of alternating dry and moist spells. A climatologist
182 (C.E.P. Brooks) spoke of the "classical rainfall period of 640 years," and a geographer (Raymond Wheeler) believed in a major alternation of dry and cold every 510 years. Ellsworth Huntington,

a proponent of the theory of climatic alternations, called the phenomenon "the pulse of Asia."

The most important of the multiple influences is believed to be that of the economic effects of climatic changes. When the climate is warm and moist, the land of the nomads is fertile enough to support the nomads and their herds, but when the climate becomes drier and colder, the rivers and lakes shrink and the pasturage is reduced. This cuts down the food supply and forces the nomads to rampage into the land of their neighbors. Speaking of the thirteenth century, Arnold Toynbee declared that the "paroxysm of aridity coincided in date with the demoniac eruption of the Mongols, and it will be seen that the physiographical recoil towards humidity likewise corresponds in date with the rapid ebb of the Mongols." (A Study of History, vol. III, p. 439).

Although the outbursts and recessions of the nomads were periodic, the rigid periodization was too mechanical and many scholars have discredited climate as the sole factor. Huntington suggests that four factors may have impelled the huge migration of the nomadic peoples, namely: climate, the inherent quality of the people especially as manifested by the leaders, the pull exerted by the wealth and the opportunities of the agricultural lands, and the push exerted by over-population. (Mainsprings of Civilization, p. 568).

A period of peace and prosperity would allow the population of the nomads to increase. However, in the desolate steppes, food was dependent upon flocks of sheep and herds of cattle and horses, and the people, unlike their sedentary neighbors, did not have the tradition nor the facilities for food storage. Any sudden change in climate which caused a reduction of pasturage and water supply would create a "time of troubles" and compel the nomadic people to migrate in search of food and pasturage.

When the nomads were experiencing a "time of troubles," the lush riches and the military weakness of the settled peoples would tempt border tribes to encroach upon the agrarian regions. Distress and discontent at home and the lure of wealth abroad furnish the push and the pull of Toynbee's theories. When the leavening of bold leadership and ideas were added, the nomads often were induced to burst out from the steppes of Asia and to set the world in commotion.

Other scholars entirely discount the influence of climate and seek the explanation for the advance and withdrawal of the nomads in social and political conditions. Owen Lattimore, who has given much thought to this question, (cf. Inner Asian Frontiers, passim), lists a number of reasons other than climate, for the eruption of the nomads. There were, for example, technological factors like the invention of the powerful compound bow and the technique of mounted archery which gave the nomads an edge over their enemies.

S 133 inaccessible gorges. To the south of the point where the terminal course of the Tarim turns and dies away in the marshes of Lop Nor, the mountains resume an easterly bearing and sink to a lower level. Beyond the eastern extremity of the Tarim Basin, the Kun-lun imperceptibly merges with the Ch'i-lien-shan along the southern edge of the Kansu Corridor. In the western portion its northern slopes, with their aridity and far advanced erosion, closely reporduce the physical features already familiar to us from the Kun-lun. The other branch extends eastward to Chinghai Province, forming the divide of the Yangtze and the Yellow Rivers.

Examination of the topographical features of northwestern China reveals that mountains, plateaus, deserts, and gravels dominate the land forms of the whole area. Level land is present along the various river banks; notably, the Ili Plain, the E-min Plain, the Kara-Irtis Plain, the Urumchi Plain, and at certain portions of the Tarim River. Human activities are largely restricted and limited by the unfavorable topography S [361] and land forms. Cities are located at the piedmonts of the mountains, and oases are situated along the outer fringes of S [161] the deserts by the side of water. The population of Northwest China is sparsely distributed through the whole section .

N 132 C. Climate

Particularly in Northwest China, where the great portion of the land is dry and sandy, the success and well-being of the whole agricultural population is bound up with the amount of rainfall, its seasonal distribution, and its reliability. Temperature, which in winter absolutely stops outside activities with its cold and which destroys crops through untimely frosts in spring and fall is next in importance.

The inland provinces of Northwest China are least influenced by ocean winds from the southeast and east, and the continentality is very obvious. The climate of Northwest China undergoes sharp fluctuations of temperature in summer and in winter, and uneven and unpredictable precipitation throughout the year.

According to collected data on temperatures from a few stations in Northwest China, Chiu-ch'uan for instance, the average temperature of January is minus nine degrees Centigrade. Tun-huang is minus seven degrees Centigrade. Because of a lower elevation than Chiu-ch'uan, Tun-huang is relatively warmer even though farther west. In July, Chiu-ch'uan has 23.8 degrees Centigrade, whereas Tun-huang has 27.1 degrees Centigrade. The annual differences of each of the stations in Kansu are over thirty degrees Centigrade. Chiu-ch'uan is thirty-three degrees Centigrade; Tun-huang is

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132 thirty-four degrees Centigrade. The larger the annual difference, the more obvious is the seasonal differentiation.

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132 In Sinkiang, the highest temperature of the year is in July. The lowest temperature of the year is in January, in Southern Sinkiang, and in February in northern Sinkiang. The temperature curve is very sharp. The average temperature for the coldest month of the year is from minus seven to minus sixteen degrees Centigrade. Khotan, in southern Sinkiang, has minus seven degrees Centigrade; whereas Altai, in northern Sinkiang, has minus 16.9 degrees Centigrade. This variation of 9.9 degrees is explained not only by the locations and altitudes of these two places but mainly by the abrrier of the Tien-shan. All the recording stations of former Sinkiang Province generally have a mean January temperature below zero. The only difference is that there are three months below zero in southern Sinkiang and five months below zero in northern Sinkiang.

The obstruction of the Tien-shan greatly influences the climate. Statistics show that all the weather stations in southern Sinkiang have a mild temperature compared with those in northern Sinkiang. This is due to the fact that the former are well-sheltered by the mountain ranges. For example, the difference in latitude from Urumchi to Kucha is only two degrees, but the temperature in January in Kucha is minus fourteen degrees Centigrade and in Urumchi is minus 19.3 degrees Centigrade. Due to topographic differences, the variation is 5.3 degrees.

Summer temperatures are relatively uniform. In Sinkiang, for instance, the range of temperatures is twenty-two to twenty-five degrees. The July average is 24.2 degrees Centigrade at Urumchi, 23.9 degrees at Kucha, 23.1 degrees at Ili, and 22.2 degrees at Ta-chang. Altai, in the extreme north, has an exceptionally low average temperature, only 20.9 degrees Centigrade. In contrast, the stations in southern Sinkiang, such as Kashgar and Khotan, have a mean temperature for July of more than twenty-five degrees Centigrade. The hottest place in Sinkiang is Turfan, which has 33.7 degrees Centigrade in July. This is the place noted as a "fire district" (Ho-chou) in Chinese history. During its hot summer days, the natives retire to underground chambers. There are two explanations for this extreme heat. First, Turfan is in a depression; it is forty-five feet below sea level. Second, Turfan is surrounded by mountains. When the air masses move in, they are warmed and rise in a conventional current.

Continental climate changes rapidly, both daily and seasonally. It differs from south to north. For example, at Khotan the year range is 32.4 degrees Centigrade; at Kucha

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132 it is 37.9 degrees , and at Urumchi it is 39.4. Because of its topographical conditions, the range at Turfan is greater, amounting to 40.8 degrees Centigrade. At all the stations, the yearly range of temperature is above thirty degrees. As to daily difference, the temperature varies more than twenty degrees. This is particularly true in summer when the earth absorbs heat and loses heat more easily.

N Rainfall is meager throughout Northwest China. Generally,
• 132 it is below 250millimeters. According to some data of the western stations of Kansu, Chang-yeh District has ninety-five millimeters; Chiu-ch'uan has eighty-one millimeters; Tun-huang has forty-six millimeters. The farther inland, the more obvious is the continentality and the less is the precipitation. Summer is usually the period of maximum precipitation. In Chang-yeh District the maximum precipitation is in July, August, and September. They have almost constantly seventy-four percent of the rainfall of the year; whereas the winter months, December, January, and February, have only five percent. The rainfall of the summer months in Chiu-ch'uan is approximately seventy-two percent of the year, but it drops to five percent in the winter months. The variations of the rainfall of Kansu Province are generally above forty
N percent, an amount definitely insufficient for agricultural
[241] usages. Irrigation in Kansu depends mainly on melting snow water from Ch'i-lien-shan rather than rainfall.

S Sinkiang is located approximately in the center of Asia.
132 Blocked by the huge mountains and gigantic desert, the moist
[131] air from the ocean can hardly move into the area so the atmosphere is dry, except in the northwestern section of the province where the topography is relatively open toward the west. When the western winds are strong, moist air is moved into the province. Rainfall is, therefore, heavier. According to the statistics, the mean precipitation is 229 millimeters at Urumchi; 280 millimeters at Ili; 274 millimeters at Chuguchak; and 149 millimeters at Altai. In southern Sinkiang all the stations are separated from the ocean by huge mountains and rainfall is light. For this reason, Kashgar receives only eighty-six millimeters precipitation a year; Kucha receives seventy-six millimeters; and Turfan receives twenty-
S nine millimeters. Charklik (Erh-chiang) has only 4.5 milli-
[161] meters in a year. It has been reported that in the Han Dynasty there were a thousand families living in the district. In 1943, there were only three families with some eleven persons remaining. The meagerness of precipitation through the years and the encroachment of the desert are the major causes for the rapid decrease of the population in Charklik. In some

S 132 places not even as much as 4.5 millimeters falls through the year. There are no longer a series of records showing either the temperature or the precipitation of the area, but the available data show that the total precipitation consists of snow water as well as summer rain in certain parts of the province.

N 132 In the geographical distribution of rainfall there shows a marked contrast between the shady side of the mountainous areas and the oases. On the whole, the southeastern part of Kansu and Shensi receive a relatively greater rainfall than the northwestern sections. For instance, Wu-wei district, in the southeastern section of Kansu, has a comparatively high precipitation, and Chiu-ch'uan, because of its location in the northwestern section of Kansu, has a precipitation that N [241] is relatively low. The former is considered an area of agricultural dominance; the latter, due to less precipitation, makes for agricultural uncertainty.

Because the warmer southern air has been blocked by the Nan-shan and Chin-ling on the southern border of the region, the temperature of Kansu and Shensi is relatively lower than those places in the same latitude in eastern China. For instance, the January temperature in Peking is minus 4.7 degrees Centigrade; in Chiu-ch'uan it is about minus nine degrees Centigrade. In July the temperature in Peking is 25.3 degrees Centigrade, whereas in Chiu-ch'uan it is 23.8 degrees Centigrade. This is due not only to the influence of location - one near the coast and the other inland - but also to the fact that the mountain range runs from west to east as the barrier which shuts off the warm, moist winds from the southeastern coastal areas of China.

S 132 Furthermore, the distribution of precipitation of Sinkiang differs from south to north of the Province. The mean annual precipitation at Kashgar is 89.4 millimeters of which over two thirds, or around seventy three percent, falls in the spring and summer. At Urumchi it is 228.8 millimeters, of which twenty-four percent falls in winter; thirty-four percent falls in spring; fifteen percent falls in summer; and twenty-seven percent falls in autumn. At Kashgar the precipitation is greatest in summer and at Urumchi it falls largely in the spring and autumn months. The Takla Makan desert absorbs the limited moisture from the air. However, in northern Sinkiang the topographical features are comparatively open so that the Arctic Oceanic winds blow toward the area more easily. Thus precipitation is evenly distributed throughout the year.

S [241] The dry air reduces cloudiness and thus increases sunshine. The agricultural activities of the area depend largely upon the brilliant sunshine for melting snow on the mountains for irrigation.

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132 irrigation. There is, therefore, a common saying in the area that sunshine equals rainfall.

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132 Generally speaking, Northwest China is affected by the high pressure of the Mongolian Plateau. It is windy throughout the year, particularly in the spring. There are also local cyclones on the Gobi desert during the hot summer. These cyclones are relatively short-lived and remain within one area. Winds blow more strongly in the spring than in other months of the year, because at this time the center of the high pressure area is moving toward the northern part of Central Asia and Northwest China is just beyond the edge of the high pressure. Since Sinkiang is in the high pressure circle in
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[132] the winter, the wind blows calmly. When the strong winds sweep down to the ground in spring or summer they do much damage to agricultural crops. Therefore, the places which face such strong winds are the places where agricultural products are relatively poor.

In summary climate is modified by topography and the distance of the area from the sea. Northwest China is located in the interior of China and is remote from seas. The huge mountains and the gigantic deserts render the climate generally dry throughout the year. According to Koppen's classification, the area lies in the zone of B climate; that is, the potential evaporation exceeds precipitation. Owing to topographical features' influence upon climatic changes, it is always drier on the southern and sunny sides of the mountains than on the
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[132] northern and shady sides of the ranges. In southern Sinkiang, for example, the climate is classified as a dry desert type; whereas, in northern Sinkiang, it is a steppe climate. This difference is mainly due to the amount of precipitation. In the steppe regions the precipitation is always greater than it is in the desert area.

In Northwest China, the temperature changes rapidly from day to day and season to season. Precipitation is greatest in the summer months but it is not reliable.

II. Mineral Resources.

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135 A. General Distribution and Some Specific Importance

Northwest China is a poverty-stricken area, due in part to insufficient fainfall and also because it was until recently, practically an unexplored region in regard to its natural resources. Although the coal reserve of Shensi is known to be rich (next only to its close neighbor, Shansi,) (if reported recent discoveries in the Northeast are left out of consideration), it has not been mined to any great extent due to the lack of a nearby market. The only other promising mineral is the

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Italy combined, but the population of the whole Northwest Region is only about thirty-five million.

Northwest China is an area of 1,232,159 square miles, one third the size of all China, with a population only 5.8 percent of the nation's total. It represents, however, a great complexity both geographically, culturally, and ethnically.

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The region is characterized, even more than the nation as a whole, as a unity with diversity. Its entity is partially cultural with a predominant religion of Islam and a common historical as well as political background. While climatic conditions are relatively uniform, ranging from semi-arid to arid of the extreme temperate continental type, its physiographic features very considerably. In addition to the thickly peopled humid and mild Han-chung Basin in Southern Shensi, there are large low-lying rich fertile riverine plains along the Wei-ho, Huang-shui, and some parts of the main Yellow River, as around Lanchou of Kansu and near Yin-chuan (Ninghsia) plus the Ili valley of Sinkiang and numerous small oases scattered along the foot of the snow-capped high mountain ranges of Nan-shan or Chi-lien, Kunlun, and Tien-shan. They are thickly populated areas either in large stretches or isolated pockets. Next come the vast plateaus and deserts of Alashan, Khara Gobi, Takla Makan, and Northeastern Dzungaria forming an extension of the Great Gobi of the Mongolian plateau. Each of them is enormous, e.g., Takla Makan desert occupies half of the Tarim Basin (910,000 square kilimeters). They are practically uninhabited except for a few small oases scattered here and there. Next are the arid and semi-arid upland basins of Tsaidam and Koko Nor in the province of Chinghai and Southern Dzungaria of northern Sinkiang. The semi-arid steppes are occupied by pastoral nomads, while the ared portion is either inhospitable or very thinly populated. Last come the lofty mountains. Some of them are snow-capped with alpine pastures and forests like Tien-shan, Nan-shan and the Altai mountains. Some of them are barren and rugged like the Kunlun, Bayan Khara, and Altyn-tagh. The former provide natural bases for the development of transhumance and lumbering, while the latter precludes any permanent human settlement, except for a few high mountain passes which are occasionally traversed by traders and travelers, such as across the mountains of Kunlun, Bayan Khara and the Pamir.

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As to historical and political relations with China, there are two distinct parts. Shensi and Kansu (excluding Ninghsia) are the sites of ancient Chinese culture - the archaeological finds of the "Oracle Bones" of the Shang Dynasty and the Yang-sha pottery in Shensi and Kansu date back at least to one to two millennia B.C. The Wei-ho valley plain is the cradle of Chinese civilization.

S 592 241 423 0.58 acres per capita as against 0.68 in China Proper. It is difficult to obtain a picture of the land tenure system because of the lack of data. But according to a field survey referred to by Owen Lattimore covering sixty-five households in two villages in the Khotan oasis, the smallest farm was 1.08 acres and the S [184] largest farm was eight acres. A further breakdown revealed that rich peasants in this group had average holdings of eleven acres, middle peasant 5.7, and the poor peasants 2.8 acres. In the area where this survey was conducted, it seems that the farms of the poor were too small for the efficient use of draft animals and there was the problem of efficiently employing, on a tiny farm, the labor potential of the large Uighur family. (Pivot of Asia, p. 169.)

S 311 313 4. Forestry

There is forest land in the rich Ili valley but it is questionable whether much timber can be exploited without serious damage to the soil. Since much of Sinkiang is desert and wasteland there are few forest reserves; out of the total Sinkiang area only about five per cent is forest land.

C. Kansu, Shensi, Ninghsia, and Chinghai

N 133 134 [243] 1. The setting

J. L. Buck refers to this part of the Northwest as the spring wheat and winter wheat-millet area. In the spring wheat area (northern Kansu, Ninghsia, and Shensi) high hills, small mountains, and narrow irrigated valleys characterize the best agricultural land. But along the great wall in Shensi, Ninghsia and Kansu are many undulating sand dunes extending from ten to seventy miles both northward and southward. When the Mongols occupied this region, these dunes were covered with grass and shrubs, but where the Chinese settled here, they cultivated the slightly more fertile land in the depressions between the dunes; once the grass was destroyed the winds blew the sand so as to make farming impossible and other nearby good soil was covered with the blowing sand. Grass in such land can seldom be resodded, and it is thus that land once useful, at least for pasture, is now entirely destroyed.

N 133 134 243 The winter wheat-millet area (southern Kansu, Ninghsia, and Shensi) extends over a great part of a loess-covered plateau, a high, dissected peneplain, carved largely from red or purple sholes and conglomerates, covered with deposits, largely lacustrine, and blanketed by wind-blown dust, known as loess, which varies in thickness from about twenty to more than 150 meters. The fields in this region are very irregular and small, and most of the surface is so eroded that cultivation is difficult and much terracing is necessary.

N 132 The climate is cold, dry, and windy in winter. The typical precipitation is low, about fourteen inches, and exceedingly

132 variable, thus making agriculture hazardous. The growing season is short, with about five frost free months; even the few crops that can be grown are often injured by autumn frosts. Dark colored chestnut earth is common only on the higher parts of the loess plateau of Shensi and Kansu provinces. It also occurs in the high plateau region of Chinghai Province. In the loess region most of the well-developed dark chestnut earth has been buried under recent loess and alluvial deposits. (T. H. Shen. Agriculture Resources of China, p. 20.)

2. Agriculture

Important irrigation systems, made possible by the Yellow River and its tributaries, have been developed in Kansu, Ninghsia, and Shensi. All these irrigated areas except Shensi produce one crop a year, such as wheat, millet, peas, or flax because the growing season is short. The large irrigated plains in Shensi along the Wei River, a tributary of the Yellow River, produce good American upland cotton in addition to wheat, corn, and millet. The largest irrigated area is in the Ninghsia plain where there are twenty-five canals from the Yellow River maintained by the provincial industrial bureau. Irrigation is only possible in the valleys, but they are narrow and comprise but a small percentage of the total cultivated area. When Buck made his survey of this area in 1929-1933, he estimated that thirteen per cent of the total cultivated land was irrigated. He felt that the extent of irrigation sometimes depended upon the prices of agricultural products fell. Because taxes were still imposed on irrigated land and some of these taxes had even increased, further construction of irrigation works was abandoned until prices commenced to rise again.

The vegetation of this region is distinguished by the xerophytic plants, bunch grasses on the high elevation, and the tall and short grass sod. In Chinghai province, the Tsaidam Basin is characterized by desert and weeds, while in the same province, in the vicinity of Kokonor, there is grass. In Kansu, along the foothills and in the mountains, grass and weeds exist while in the desert area of Ninghsia, only weeds grow. Grass grows in Shensi along the Chin-ling and Hsang-lung mountain ranges.

There is an inadequate amount of green manure crops used in this region, which has resulted in a shortage of organic matter and a deficiency in plant nutrients, especially nitrogen. In most of the area, straw of rice, wheat, rape, and legumes are not ploughed under but are used for fuel, decreasing an important source of organic matter to the soil and removing minerals necessary for plant growth and crop production. Application of chemical fertilizer in addition to local manures and the plowing under of plant residue is very necessary to soil fertility.

241 311 131 423 The following chart indicates the area of the four separate provinces, the amount of cultivated land, the number of farm households, and the average number of acres per farm. (Cressey, p. 105).

Province	Area in Acres	Cultivated Land	Farm Households	Acres per Farm
Kansu	96,741,133	4,310,000 acres	793,000	5.4
Ninghsia	57,653,372	304,000 acres	54,000	5.6
Shensi	46,432,319	7,514,000 acres	1,385,000	5.4
Chinghai	164,874,016	1,284,000 acres	237,000	5.4
Total	365,700,840	13,412,000	2,469,000	

Of the total area of these four provinces, roughly thirteen per cent is under cultivation (1946 figures). A survey of the National Agricultural Research Bureau findings of 1943 indicates that additional land that could be brought under cultivation is, except for Ninghsia, extremely limited. (China Handbook 1937-1943, p. 547.)

241 311 133 132 The extent of cultivation on the hills of this area depends upon the elevation, steepness, and the dryness of the climate. High elevations have a greater precipitation, more favorable for farming. The drier, steeper hills have sparse, wild vegetation growth only; used for sheep grazing. Although one is impressed with the degree to which such hilly land in this dry climate is cultivated, it is probable that it has extended beyond the most profitable use of the land. In fact, according to one agricultural economist, it might be more economical if more of this land were devoted to grazing; if better varieties of grasses and improved breeds of sheep were introduced, the income derived from pastoral utilization might be greater. (T.H. Shen, Agriculture Resources of China, p. 153.)

241 133 134 Terracing is prevalent and is practiced on eighteen per cent of all cultivated land. Much of the hill land is also cultivated in a modified form of contour farming. The slopes of the fields are so steep and the fields so wide that although there is some attempt at contour farming, it is not well carried out and the erosion is very severe; in fact, erosion is so serious that production is meager and some of the land has been abandoned.

241 The principal crops grown are wheat, cotton, rice in the irrigated areas of Wu-wei and Ninghsia, millet, and Irish potatoes. Cotton production is particularly extensive in Kansu and Shensi. The following figures are from the China Handbook (1937-1943) and they show the acreage and production for 1937-1942.

2: Teichman G-5 (1919) 1921 AF13 Northwest China AF13

The pronunciation of Hsingan on the Han River and Hsian, the provincial capital in the Wei River basin, is almost identical, and as the Chinese themselves sometimes misunderstand one another when referring to them in conversation, it is rather a hopeless task for the foreigner. The two names are really Hsing-ngan and Hsi-ngan. If one wishes to make certain of being understood one should refer to Hsingan by its old name of Hsingan Chou or its new one of Ank'ang Hsien (not really new as this was always the name of the district), and to Hsian as Hsian Sheng or Ch'angan Hsien.

The American Railway Group, having secured the concession for the construction of a certain mileage of railways in China wherever they could find room between the staked out claims of other Powers, have, according to the newspapers, elected the upper Han valley as one of the scenes of their activities, and propose, it is said, to build a line from Laoho K'ou up the valley of the Han into Shensi, and thence across the mountains into Szechuan. In view of the richness of the country it will tap, and to the fact that it is not unlikely to be the first line to solve the great problem of the railway penetration of Szechuan, the object of so many schemes, this Han Valley Railway constitutes one of the most interesting and attractive of the many railway propositions at present in contemplation in China.

We remained at Hsingan two days, during which it rained incessantly. The climate of the Han valley is rather a treacherous one and fevers are common. We were now bound up the Han basin to Hanchung, a distance of 650 li. The road we followed is the main highway through this region, though much of the way only a mountain footpath eighteen inches wide. Most of the traffic, however, goes by river. Like most of the roads in the Han basin it is really a track for coolie porters, but mules and ponies can travel by it easily enough except for one stage along the Han River beyond Shihch'uan, which is rather dangerous for pack animals. As the main road connecting two such important places as Hsingan and Hanchung it well illustrates the extraordinarily roadless condition of China. Nor in these days of railway construction is it likely that China will ever be provided with roads as the word is understood in other civilized

2: Teichman G-5 (1919) 1921 AF13 Northwest China AF13

suitable and satisfactory state of affairs. Unfortunately my enquiries showed that these decapitated bodies were not those of the real brigands of these regions at all, but of some strangers who arrived at the city gates and could not give a satisfactory account of themselves, and who had accordingly been executed so as to be on the safe side.

Most of the magistrates in Shensi are now natives of the province, young students and military officers of the new school, but in one of the districts on this road we met an official of the old type of magistrate *de carrière*, a Hunanese who had just come down from Chinese Turkestan where he had been serving for years. Though the virtues of the new type of local official in China may be great, it was a pleasure to meet a gentleman of the old school with his many and varied experiences, and we had a long talk about mutual acquaintances serving in the deserts of the far North West.

From Yichün the path follows down the ridge descending gradually for 35 li to the village of P'iench'iao, where the mountains give way once more to loess hills and the ridge flattens out into a plateau. The track continues across this tableland, winding to and fro to avoid the usual rifts in the loess falling away into the valleys on either side, and then descends steeply for the last five li to reach the district city of Chungpu lying in the narrow valley of a stream flowing east.

We were now once more in the loess with its glaring dry heat and choking dust. The season of the year was early June, when all over North China there is a spell of very hot dry weather, corresponding, presumably, to the heat of Northern India before the monsoon. In July and August the rains break, and though the steamy heat is then trying enough, and the loess is turned into slimy mud, the change is a great relief.

At Chungpu we were met by the Taoyin of Northern Shensi, whose seat is at Yülin Fu on the edge of the Ordos. His post is at present a most difficult one owing to the northern districts being so overrun with brigands. He told us that the extreme north of the province was much less desolate and more prosperous than the districts we were now traversing. We had heard much of the terrible "bitter-

2: Teichman G-5 (1919) 1921 AF13 Northwest China AF13

CHAPTER VI

FROM YENAN AND YENCH'ANG THROUGH THE MOUNTAINS OF EASTERN SHENSI BACK TO HSIAN FU

Yenan—American attempt to exploit the oil deposits of Northern Shensi—Yench'ang—Yich'uan—Brigands and soldiers in Northern Shensi—Hanch'eng—How to travel in comfort—Hoyang—Ch'engch'eng—P'uch'eng—Fup'ing—Sanyuan—Baptist Mission—Cotton cultivation—Back in Hsian.

YENAN FU, now known as Fushih Hsien, a second class district city, is a large place in area as cities in Northern Shensi go, but is nowadays extremely poor and dilapidated as the result of the constant depredations of brigands in the neighbourhood, most of the shops in the main street being deserted. It is built in the narrow valley of the Yen Shui, which it completely fills at this point, and like Fu Chou it has guarded this passage into China against the inroads of the Tartar hordes from the North for thousands of years. On the hill side opposite are some remarkable cave temples of great antiquity, one of them containing innumerable (said to be ten thousand) little figures of Buddha carved out of the sandstone rock. The neighbourhood appears desperately poor and the crops very backward, the little wheat we saw being still green and barely in ear during the first half of June, though the elevation is only about 3000 feet. Northern Shensi and N.E. Kansu appear to be drying up and turning into desert, perhaps owing to the existence of a little-known range of mountains in Shansi, just east of the Yellow River, which, rising in places to a height of over 10,000 feet, must act as a barrier against the moisture-laden winds from the coast. Coal and iron are said to be abundant in the neighbourhood, but lack of means of communication renders them useless except for local consumption. Petroleum is also found in Northern Shensi, and the attempts to exploit these oil deposits have been, apart from rebellions, revolutions, and brigandage the most important events of recent years in this region.

In the past mineral oil used to leak out of the ground

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the North West after Hsian Fu, and all the trade there is in the province converges upon it. Traders from Tientsin, Szechuan, Turkestan, Mongolia, Siberia, Tibet, and even India may be met with in its streets.

Kansu is considered by the Chinese of other provinces to be a dreadfully bitter place (*k'u ti hen*), nothing but wild Mahomedans and no rice to speak of; but for a European it is in many ways the pick of the eighteen provinces. Lanchou lies a little under 5000 feet above sea-level, which in that latitude means a white man's climate, no mosquitoes, and the wearing of European clothing all the year round. As regards food, excellent wheat flour, mutton, and milk are always obtainable, the two latter often scarce in other parts of China, and game is extraordinarily abundant in many regions. I have only one complaint to make against Kansu and that is the brackish water in certain parts. At Lanchou itself there are springs of sweet water at Wuch'uan Shan, a collection of temples on the hills immediately to the south of the city, and the Yellow River water is also good after it has been allowed to stand and clear itself.

Lanchou being situated near some of the best sheeps-wool producing regions of Asia, and the climate being essentially a northern one, common sense indicates it as a suitable centre for a cloth-making industry. This was recognized as long ago as the days of the great General Tso, who established a cloth factory, which was subsequently modernised during the comparatively progressive and constructive era preceding the Revolution by the introduction of modern foreign machinery and several Belgian instructors. But the Revolution put an end to progress in this enterprise as in so many others, and the foreigners have now all departed, and the factory does not flourish. All the same, on my departure from Lanchou, the Governor insisted on my taking away, as mementoes of progress in Kansu, two locally manufactured blankets, made, I think, of camels' hair, which were really first-class articles, and hard to beat anywhere for warmth and good wearing utility. There ought to be a large market for native-made cloth amongst the Kokonor Tibetans and beyond, but the trade seems never to have been developed successfully. There are also other so-called factories, for the manufacture of matches, soap, etc.,

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trough below the surrounding level of the valley. Just beyond Hsitachai the path leaves the T'ao River, along which another track runs direct to Choni, and turns up a side valley to the north to reach a semi-Tibetan hamlet called Shanch'a, 80 li from Min Chou, where we passed the night in the house of the headman. Pheasants were abundant in this picturesque and well-wooded valley.

At Shanch'a the path turns up a side ravine leading after an hour's march to an easy pass, whence there is a descent for another hour into a bare valley, followed by a rise over a second low pass, and a descent to New T'ao Chou in another bare open valley, a march of 40 li in all. New T'ao Chou (now called Lintan Hsien) is the official town, as opposed to Old T'ao Chou, distant 60 li, the commercial town, and is an empty shell of a city of no importance. About half the few buildings inside the walls had been destroyed by the White Wolf rebels the year previously. We were accommodated in a temple which the magistrate had fitted up temporarily as his yamen. The city lies in a bare open valley some 20 li or so north of the T'ao River in a region of treeless hills of loess, red clay, and red sandstone. This somewhat dreary belt of bare red hills intervenes practically all along this border between the loess of Kansu proper and the pine forests and grass lands of the Kokonor country, and corresponds roughly to a similar Mahomedan wedge between Chinese and Tibetans. The red hills round New T'ao Chou are cultivated and dotted with villages, mostly Mahomedan. The Moslems extend from here along the border to their real strongholds round Ho Chou and Hsünhua, and thence north of the Yellow River to beyond Hsining. We were travelling round the two T'ao Chous during the season of summer thunderstorms (early July), and usually experienced several daily, some very severe and rather alarming in this elevated region. On one occasion hurrying into a Mahomedan farmhouse for shelter we found the inhabitants at prayer as though in a mosque; this custom of using private houses for prayer is, I was told, confined to the followers of the "New Sect," which is very extended and influential in Kansu. Our sudden intrusion was not resented in the least, and on this, as on every other occasion when I met Mahomedans in Kansu, we were

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133 li out cultivation and houses are reached at Kaochia Ta Men,
487 the beginning of the large Chenfan oasis, and for the rest of the stage the road runs through rich irrigated lands with occasional excursions into sand dunes.

361 Chenfan Hsien is a prosperous little district city in a highly fertile oasis. Immediately round the town is a belt
312 of rich cultivation, and patches of irrigated land occur in the
243 desert for 200 li to the north. There are no villages in these oases, the people living entirely in walled farms. Wheat is the main crop raised, and the abundant water supply from the snow-fed streams for irrigation purposes, combined with
[132] an almost rainless climate, appears to assure good crops with machine-like regularity. Chenfan compares favourably
361 with most towns in Kansu, the streets are clean and well
634 kept, there is a noticeable absence of ruins, and the shops display a surprising variety of goods. At the time of our visit the district enjoyed the services of one of the best territorial officials we met throughout the North West, a young man who really appeared to have the interests of the people at heart, and to devote himself as far as lay in his power to improve their lot. He remarked that the post, though so isolated, was pleasant enough in the summer, but that in the winter the north winds from the Alashan desert were terrible, much worse than the severest winter sandstorms ever experienced at Peking. The inhabitants of the surrounding oases seem entirely cut off from the rest of
487 China, and form little self-supporting communities. Chenfan itself, however, is, strange to say, in direct communication
133 with Tientsin and the coast by means of a much frequented camel route from Kueihua Ch'eng to Liangchou across the Mongolian grass country and the Alashan desert. This road, which debouches from the desert at Chenfan, enables the Mahomedans of the Ho Chou and Hsining neighbourhood to communicate with the coast without passing through Chinese Kansu at all.

From Chenfan we had to proceed to Hsining, the frontier town on the high road to the Kokonor and Tibet. Enquiries showed that we had the choice of two roads, to the north or south of the snow mountains behind Liangchou respectively. As the latter would have meant retracing our steps to Kulang, we decided to follow the former, which entailed going due

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cartload of loess soil, and at last proceed with the putting of our house in order. A fireplace built entirely of mud-bricks, into which a grating of half-a-dozen iron bars was fixed, made a very satisfactory cooking-stove, and a paraffin-oil tin let into the back served as a boiler. We also set up an iron stove we had brought with us, at great labour and expense, but which proved to be not only an immense comfort but an absolutely vital necessity, when the real depth of winter came upon us.

We visited several carpenters' shops in the hope of finding ready-made furniture, such as a table, bench, or stool, but the only articles for sale were, in every case, nothing but coffins. Red, black, blue, varnished or unvarnished coffins were temptingly ranged before us, but for the living, nought! Fortunately, however, our kind landlord came to the rescue by lending us a table and three stools, while the coffin-shop supplied us with as many planks as we required. These, supported on bricks and packing-cases, made the dresser, bookcase, writing-table and beds. A side-shelter was next transformed into a sleeping apartment for our women students, and thus, all being in order, we fondly imagined ourselves comfortably settled, but the neighbours shook their heads sagely, saying: 'Wait till the winds come!'

Our happy illusions were soon dispelled, for one night, not long after, we were suddenly awakened by the alarming roar of a tremendous gale, shaking the boughs of the poplar-trees and stripping off every leaf that remained. This preliminary onslaught was then quickly followed by an unearthly yell as the whole force of the tempest descended upon the city, carrying with it volumes of sand that whipped and cut against our pavilion like a volley of musketry. Without a moment's interruption the gusts swept in through the

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fragile paper windows, deluging us with grit as we lay in our beds. No sleep was possible, and when daylight came we found our room literally buried under a thick layer of Gobi Desert dust, the shape of each one's head being defined on the pillow, while the soft earth of the floor was ripple-marked like the ribbed seashore at low tide. Experience taught us, subsequently, that the only way to smooth it down was to sprinkle the surface with water, and then spend all our spare moments in stamping it flat. This process, however, was not very successful, for the powdery soil remaining loose through the winter, small articles were frequently buried in it, only reappearing at intervals when an extra watering brought them once more to the surface!

For forty-eight hours the fearful blasts persisted, without one moment's pause. Not a drop of rain fell throughout, and we finally emerged with hair, eyebrows, skin and clothes heavy with the particles, and with bodies exhausted and nerves strained by the tension and magnetic quality of the storm. The danger to caravans when overtaken by such a visitation is extreme, and many instances are recorded of carts, horses and drivers, all of which having been first battered to pieces disappeared for ever under the roaring sands.

The sight of our room afterwards made us realise that something must be done to stop up the crevices and holes in the woodwork. The large sheets of brown paper used by the Bible Societies in sending their goods by post met our difficulty, and for one whole day we cut out strips, which our old retainer with the help of a basin of paste affixed to every crack through which, only too plainly, the daylight gleamed. Suchow being totally unprotected from the vast expanse of Gobi on the west, and the sands of Mongolia on the north, this last experience proved to be but the first of many, and

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returned, and the Military Guard of Kiayükwan having bade us 'good-bye and a pleasant journey,' we started off in good spirits; nevertheless, silence soon fell on us when we realised we had turned our backs on China, and were ourselves literally without the Gate.

We were now to learn by personal experience that the cold of the desert nights is only equalled in intensity by the midday heat. Water being unobtainable for very long distances, the strain is too great for the animals during the day, consequently all stages must be taken by night. It was 5 p.m. when the many-storeyed tower of the fortress finally disappeared beyond the horizon, and the undulating expanse of the Gobi was all that was to be seen lying around on every side. Desert travelling is a memorable experience. Immediately after sunset an icy breath steals along the earth's surface, and instantly the carter dons his heavy sheepskin coat. Silence instinctively falls on the party as the twilight swiftly closes in, and the horses settle to a steady stride. Thanks to the telegraph poles with their single wire, we still have *one* link left with the outer world; so we cannot miss our way.

Generally, once in the night, we passed a string of carts from distant Turkestan, or we heard, a good half-hour before they actually appeared, the clang of bells belonging to a caravan of at least fifty camels, which shuffled past us grunting, soon to be swallowed up in the surrounding shadows. Some time in the night we heard the jingle of merry bells peculiar to one traveller, and all would cry out: 'Here come the Mails.' Unlike all other riders, the Courier comes at a sharp canter, his heavily-laden horse in a lather. At each stage a fresh horse and messenger are waiting to carry on the bags. He is always cheerful, always friendly, and full of information. According to his account it is we who are

1 [Between Kiayükwan and Yümen--Analyst]

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bid her farewell, before she would permit the sacred words to pass her lips she washed her face and combed her thin hair, feeling it to be disrespectful to the One True God to address Him unprepared. Such a soul as this, met with on the road of life, one can never forget. She was ripe for the Call; and she heard it, and was glad.

The next city is Ansi, which also bids fair to disappear under the encroaching sands, as these have already drifted round it as high as the top of the wall. It is a cold, storm-swept place, exposed on every side, and with neither coal nor wood obtainable. The wind is said to blow every day in the year, but in the winter it is so fiercely terrible that all shops are closed, and everything is at a standstill. Every household then lives, eats, and sleeps on its dung-warmed *kang*, nor is it surprising that so many while away the weary hours with the fumes of the opium-pipe. Ansi lies at the cross-roads, where the great track from Suchow turns off towards Hami and Eastern Turkestan, meeting also the main road to the Oasis of Tunhwang, four stages to the south-west. The fame of Tunhwang had already reached us. We had entertained at Suchow a party of American archaeologists from Harvard University, who had recently been there for the purpose of seeing its art treasures. Not being able, however, to fulfil their purpose, they were returning to Peking, carrying away a rather unfortunate impression of the Tunhwang population, and they warned us that we should find them turbulent and somewhat rough-spoken. This did not alarm us, however, as our search was for treasure of a different kind, which called for excavation of another, and less obvious nature.

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waddling of a small bear, but in flight they were superb.

It was not until after sunset that we drew near the first farm of the Hwahaitz oasis. The Suchow enquirer came out to meet us, and we found a room prepared for our use. The *kang* had been covered with a length of white cloth; a kitchen with firewood was at our disposal, and a meal was being prepared. But we were too tired to sit up and eat it, and securing a cup of tea, we lay down and promptly fell asleep.

We were up early, but not before the crowd had begun to assemble in the courtyard. After a breakfast of pancakes made of flour into which oil had been kneaded, and which we dipped into vinegar, we went out to see the place. The gates of the walled enclosure in which we were staying were already decorated with Christian posters, and the students were out choosing a suitable site for the tent.

The name of the place signifies 'The Flowery Lake.' The lake, however, after which it is named, proved to be but a small pond in which naked children disported themselves, and where the beasts of the local farmers were brought to be watered. The oasis is circular, large, and extremely fertile. The roads were bordered with poplar and willow trees, and the fields were sown with wheat, millet and flax. We followed the high bank of an irrigation canal, and passed the entrances of several large, prosperous and beautiful farmhouses. The locality is very hot by day, but exceedingly cold at night; at sunset the air hummed with mosquitoes, which, however, only lived a couple of hours before succumbing to the night chill.

We returned to find the site chosen, and the tent pitched. Larger crowds gathered even than at Chikinpu, and the sales of gospels were most remarkable.

free spot to be found. We were soon tired of searching and so we 485
set up our tent in a quiet corner and drove the ponies into an empty, unclaimed courtyard, of which there are a great many since the last Mohammedan rebellion. We set up the tent in order to "make the face attractive," as the Chinese say and so that people would not say: the European lay down in the street. But the wind kept blowing the tent down and so we lay in the open street after all; on top of everything, the temperature was 20°.

In the early morning we then found an inn (Plate XXXVIII). We were even obliged to call it a good one because the doors could be locked, but of course the guest had to bring his own lock. I immediately handed out a list of the things we still needed. Even tall Tschang hurried forth to do errands, although it would perhaps be more accurate to say he deigned to set out in order to look for things. He always undertook only those commissions that gave promise of the most profit for himself. Another servant repaired the windows of my room so well with tissue paper that the smoke from the wood fire which was lit on the floor of my room, presumably to warm me, made the tears run down my cheeks. Thus, the rare advantage of a 354
hotel room with a door that locked was rather illusory. In the end it 132
was better to warm one's hands at a blazing wood fire in an open court. In Dankar there is /177/ neither coal nor charcoal to be had, I might almost say, a proof of the fact that one is no longer in China. I need not say that nobody knows how to build a stove. The people of Dankar, Hsining and other places in highland China and Tibet have the sun to keep them warm in winter. Every day, even in December and January, women and children can be seen in a sheltered corner beside a wall, going about their usual business. Even though the air is several degrees below freezing, the sun is so warm that one does not feel the cold. Little children play out of doors from early morning on, dressed in only a short jacket with perhaps sock-like shoes on their little feet. But you never hear them complain about the cold. If you enter a yamen, you see the secretaries carrying their tables and chairs out of their offices and painting at their legal documents in the warmth of the sun.

At noon I had a call from the ting of Dankar, a friendly, middle- 579
aged gentleman from South China. The major of the town had called earlier and taken the occasion to offer me for sale a very lean pony. The ting came on behalf of the amban of Hsining in order again to confer with me about my journey to the Koko Nor. The amban I was told, requested me to wait another few weeks until

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and sixty of the "new" who were forced to settle here. They are still unable to get along among each other. 563 361

Hsining. But there they may only come as transients in order to carry on their business and must live in the suburbs while their families are obliged to remain in Bamba.

I stayed a day in the town and bought mules and horses for my forthcoming new journey. A great many people positively implored me to take them along as servants. There were competent men among them who knew the steppes and could speak Chinese, Tibetan and Mongolian and so I took several of them into my service. When the contract was signed by both parties and by witnesses the men asked for the customary advance. 000

"We want to fetch our warm clothing and our felt coats immediately for the journey into the cold steppes. Our things are in the pawn shop in the city of Mo bai tschen," they said.

"But do you have so many debts," I asked, "that you must pawn even your clothes?"

"Heaven forbid! But we have wives and children at home and so it is far better and safer to keep our clothes in the pawn shop."

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/257/ CHAPTER VIII

Departure for the Ts'ao ti

When it is winter in the Central Asiatic plateau it is not only bitter and bitingly cold but a harsh wind sweeps over the land, turning everything rigid and lifeless, so that the people who live up there, the devout and ceaselessly praying lamaists, have learned to speak not only of a fiery, but also of a cold and ice-filled hell into which poor sinners are cast naked and bare in order to be tamed and purified in a hell in which glaciers will devour them, icicles spear them, icebergs crash down on them and crush their bones with burning cold blocks of ice. But besides the cold which it brings, the Central Asiatic winter is also uncomfortable because of its dryness and its dust. Snow, the mark of our European winter, is a rare phenomenon. Week after week and month after month a radiant, cloudless sky stretches over a dried-up, impoverished earth. All living creatures are envoloped in a white veil, a dust-impreganted 132

[text continues on p. 441]

132 atmosphere that scrapes our throat. The ball of the sun sinks in the west into a pale, grayish-white haze long before it has reached the horizon. And morning and evening the sky turns yellow, lemon-yellow and pale, and the entire firmament never catches any of the lavender and red tints, so dry and devoid of moisture is the winter air in those heights. The snow blanket which we Europeans like to see in winter comes only with the beginning of spring when the monsoons from the Chinese lowlands, from the moist coastal regions of southern Asia sweep up into the central highlands of the continent and when the moist warm air of the lowland has cooled off after it reaches the mountains. During the monsoon rains precipitation is greatest on the border of China and Tibet, in the regions where even the valley bottoms with their human settlements are so high that agriculture can scarcely be carried on even in these rather southerly latitudes, where the mountains suddenly seem to reach into the sky. Here the air, in passing over, discharges the largest amount of water ballast.

Thus on the ninth of March it began to rain in the miserable Chinese Mohammedan village of Bamba where I began assembling my new caravan. There, 2,700 meters high, the last wretched barley fields in the narrow valley border on the winter pastures of the Tibetan nomads and close by the mountain giants rise up more than 4,000 meters. At ten o'clock when I climbed into my saddle there was a dense snow blanket ten centimeters deep, from the night before; it was the first of the entire winter.

132 We quickly left the narrow, rocky valley, turned our backs to
133 the shrub- /258/ covered border mountain of Tibet and went back into the bare, yellow loess hills of China, and after only an hour's ride over loess ravines and loess saddles, there was not a patch of snow to be seen anywhere. Precipitation had occurred only where the air was forced to rise steeply upward. The loess-hill country at the brink of the Tibetan highlands had been waiting in vain for snow and rain for many months. Since we rode fast so that in the end we would not find the iron bars of the city gates of the Hsining frontier fortress closed in our faces, we moved all day in a thick cloud of dust which the swift feet of our ponies stirred up. We were surrounded only by barren, low hills composed of loess-covered reddish layers of gravel (100, 200 meters higher than the valley floors). Our surroundings shone dust-colored, yellow, grayish-
000 yellow and blinding in the bright mountain sun. I hated this loess landscape and I breathed a sigh of relief when in the evening at

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133 The town which I had come across was called Kabatalen and the river was the Tschabtscha Chu.

Now, inasmuch as on all our maps and even on those in the Stieler atlas a river by the name of Huyuyung Chu is shown as arising in the Dábassu Nor and flowing through the region in which I found myself, I was not a little baffled by the fact that my Tschabtscha Chu and the Huyuyung Chu were not supposed to be one and the same river. In order to clarify this point and make certain of it I did not travel due south from Kabatalen but turned around again and went in search of the Huyuyung Chu.

137 The days in Kabatalen and before that in the dry valley were very bad for the animals. There were many stones and there was little grass. The valley slopes were bare; they consisted of rubble, of many coarse granite and quartz fragments, and the poor beasts walked themselves foot-sore without finding anything. But on the valley floor and on the edge of the brook the winter grass was completely consumed except for a few stubbles and dried up, hard /295/ shrubs. In the lowest and most protected places also the new grass was not more than 2 centimeters high, and even these insignificant traces of it were to be found only on the edge of springs which are remarkably abundant in Kabatalen because it is almost on a level with the Hwang Ho. In spring the animals are exceedingly thin because the yaks are dependent solely on open pastures, since the nomads do not make hay and do not feed them during the long winter months. A few days of fasting and slight exertions and they are completely exhausted. Thus, from the beginning I was forced to count on losing at least a half dozen oxen when I crossed the tala. But after a day of rest in Kabatalen the prospects became much worse, and on April 30 when I left the Tschabtscha Chu Valley there were already more than a half dozen stragglers. In the evening three yaks were missing; they had remained lying in the sand along the way. The first longer trek was already too much for them.

133 At Kabatalen we had already left the valley of the Tschabtscha
132 Chu and climbed up the plateau of the tala. During the first few hours of the morning we went over a hard and completely level surface like a huge threshing floor on which only now and then a miserable little plant grew. The soil consisted of pebbles that were solidly cemented together. A few dunes lay in our path, yellow piles 20-30 meters high, that looked as though giant hands had here worked with a winnowing shovel and separated chaff from wheat. Besides them the plain had been swept clean of the last grain of sand. The dunes

were of the typical and well-known barchan formation, crescent-shaped, flat on the convex side and straight and steep on the concave side. The convex side with its gradually ascending slope was turned toward the west. This clearly indicated that the prevailing wind in the tala came from the west. This westerly air current prevails during the cold season; it comes from the interior of the continent, is devoid of all moisture and dries the sand to such an extent that the latter follows the whims of the wind. The monsoon which comes up from the sea in summer cannot change the formation of the dunes because it is much gentler than the wintry west wind and is accompanied by rain which solidifies the masses of fine sand. In summer grass sprouts on the dunes, making it easier for the grass to go on growing during the winter.

Toward noon we reached a terrace that was three meters higher, and then an extensive zone of pure sand. Dune followed dune and made progress difficult for the animals. Here our losses began.

All day we had a small group of hills in the west as our guides. When we finally reached these, the surface of a lake suddenly appeared. A dark blue body of water shone out from among mountains of yellow sand. It was the Si ni Ts'o and at this lake ends the Huyuyung Chu for which I was looking. The Si ni Ts'o, like the Bayan Nor, I discovered, has no outlet, but like the latter it contains fresh water. Its greatest length from east to west is 5 kilometers and from north to south, 3 kilometers. A long narrow neck of land which extends into the lake from the west creates two almost completely separate lakes, a northern and a southern one. This promontory has a high, sharp ridge of stratified sand masses and tells /296/ us the history of the lake. The Si ni Ts'o is an old loop of the Huyuyung Chu. The river empties from the west into the southern one of the two branches of the lake, and it formerly flowed out from the northern one in a northwesterly direction. But this outlet is today dry and covered with sand. I suspect that the large springs in the valley of Kabatalen are connected with the Si ni ts'o. They are lower than the level of the lake and the water of the lake can without difficulty flow thither under the hard, top layers of sand and pebbles of the tala. For this reason, too, the lake up to the present time will probably not have become the least bit salt. (1)

1. Lake Si ni Ts'o is frequently mentioned in the "Meng gu yu mu dyi," but is entirely lacking on our maps up to now.

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The tissue of lies that my men invented was very adroit but for me it had the great disadvantage of keeping me captive in my tent. As soon as Tibetans approached, I had to hide my nose and all day I was obliged to play the indolent lao ye. I felt like a prisoner, but finally I unpacked my books and became absorbed in Faust and in Penck's Morphologie der Erdoberfläche. In this way the days of rest passed all too rapidly. 000

On May 3 we decamped. On the rest days I had had two goats killed and their skin removed without making a slit in the abdomen. The resultant bags became our water containers for the forthcoming march through the desert. We figured that we would not find water for three days. The two goat bags had to suffice for us eleven men.

As soon as the hills around the Si ni Ts'o lay behind us we traveled on through very low undulations. Flat steppes with a nice high stand of grass alternated with pebbly earth, with groups of barchan dunes and with areas of long dunes consisting of mealy sand. Not far from the lake on the hills which consist of stratified sand full of limestone and that rise up 150 meters above the present water level, I found fossilized (Pleistocene) fresh-water mussels and petrified bones of mammals such as I had already collected at the Gungga Nor. I gained the impression that the valley plain was once much higher and that the storms from the west carry everything away from here that has not hardened and been cemented together by rivers and lakes. 133

Day after day now the sun emerged from the clouds. The snow which covered the steppes on the morning of May 1 had long since disappeared completely. But it remained hazy; we could seldom get a clear view of the distance and the mountains surrounding the tala appeared only occasionally and we saw only their general outlines. [132]

When we left the Si ni Ts'o we kept to a southwesterly course because I thought I would thereby get out of the tala most quickly. On the evening of the first day's march in the desert the entire sky was covered with blood-red flames. It is rare that the sun can thus color the air in arid regions. The Chinese therefore assumed that there would be a heavy downpour during the night, and set up the tents. Usually we all slept in the open in order to be on the spot in an emergency. The nearest range of the Semenov Mountains, the southern enclosure of the tala, were sharply outlined against the horizon. Broad snow fields glistened from the higher peaks, and glowed red in the last rays of the sun, and the narrow rocky ridges formed blue-black silhouettes, like charred rafters and beams of a 000

5: Tafel--532 T-3 (1905-1908) 1914 AJ1 Tibet AJ1
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1884, (2) in the following words: "They threw themselves into the C 631

2. Proceedings of the Royal Geographical Society, 1885, p. 171.

attack with piercing shrieks. The hooves of their steeds rumbled hollowly on the damp field. Their long spears glittered and gleamed; their long cloth garments and their black wavy hair flew in the wind. The wild, bloodthirsty horde descended on us like a cloud" etc., etc. In 1907 I saw an old man in the tents of the Horkurma, who has been limping around since that time. A Russian bullet smashed one of his legs and I had to present him with an extra khadar for this.

The Sidia Tibetans had been at the spot where we encountered T 768 775 them for only a few days. Shortly before, the old mother of the chief had died. The tribe had quickly pushed on to the new encampment, after having left the old woman's body in a ravine, so that it could be devoured by vultures. Since then, there were many hundreds of butter lamps burning in the tent of the chief and priests were constantly praying there. The /318/ fear of the spirit of death is what drives the relatives forth into a new camp so quickly. For the same reason, the clothes of the dead person are no longer worn by any of the relatives, and the smallest object must be released from the spirit's ban before the heirs accept it. The Tibetans believe that otherwise the deceased will inflict all kinds of discomfort and misfortune on the new owner of these things. The dead and the living hate each other.

We did not travel on until May 22. Meanwhile it had rained much C 132 and heavily. The summer monsoon had set in in full force. The temperature stayed above freezing. Heavy cloud masses came up from the southeast.

During the two days, the humbo had visited us only once in our 000 tents. Most of the time no one paid any attention to us. All my men were vexed and anxious because the humbo had not reciprocated in giving us presents. They concluded that he was hostile to us. But instead of being on the alert they became ill-humored. At night I found the sentries sleeping in their tents and during the day I discovered three of the men openly smoking opium. In the contracts I specified that I would not tolerate opium smokers, and each one I hired had assured me that he did not smoke. Now I discovered that there were some who did. But when, by reason of my contract, I took away their opium and also wanted to confiscate their apparatus for smoking, they applied their knives to their throats and threatened to

college - - - yes, indeed, I am still /321/ sweating from the ordeal. 000
I had not done well. A little old man who limped had reproached me bitterly for not even knowing verbs endin, in "μι" and for learning the useless, barbaric language of Chinese instead of classical Greek. - - Something is groaning beside me. I light the light and see Da Tschang in front of me; he is looking at me with glassy eyes. Suddenly he jumps up and cries that he must go to his mother, she is down at the Tschürmong River and is calling him. Over his feverish head with its tousled queue the walls of the tent heave up and down. I consult my watch to find out how much longer I have to wait for morning in the presence of this uncanny sick man, but all the watches have stopped. I call my servants. No one answers. I get up laboriously. I was lying in bed in a frightful condition. - - When morning came I learned that my men had left me in a delirious state for two days. But from now on I and the rest of the sick men recovered rapidly. On the second of 132
June I was already able to take a short walk, with the help of the two Ma. The country round about the camp was beautiful. Hares frolicked about, farther down in the ravine leading to the Tschürnong, all kinds of fowl could be heard clucking, and there were even gray doves. My men shot many of these and prepared wonderfully tasty soups for me. Seldom have I felt so happy to be alive as on those days. It seemed to me I was recuperating from a long illness, and yet it had been only a brief attack. Simultaneously with this new strength which had come to me, spring arrived in the valley. The prairie round about took on a lush green color. My men brought brightly colored anemones and yellow primroses, similar to our cowslips. All day long we could hear the call of the cuckoo and a great many larks sang just as they do at home in Germany. But unfortunately the Tibetan spring brought wet weather. Low rain clouds constantly sped up the Tschürmong Valley and brought rain during the day and snow at night. There was often a layer of snow 10 centimeters deep in the morning. We also had a great many thunderstorms with severe lightning, and yet the temperature rarely went up to $+10^{\circ}$ and at night the average was still -1°. For those of us who were convalescing the most uncomfortable aspect was the heavy downpours which proved too much for the tent walls. The cold mist that lasted for hours inside the tent seemed to penetrate to the marrow of our bones. There was not a dry stitch on us. Bottomless swamps developed in the places where the animals were tethered at night. Even the most elaborate system of canals did not help to drain off the water. We became so sick of 000
the camp site that we traveled on even before we were completely

[text continues on p.540]

On June 13 we battled with the mud from six in the morning until far into the afternoon. I crossed a wide valley that extends into the plain of the Tossun Nor, and then climbed over a huge moraine wall. In this way I again came to the upper course of the Tschürnong Chu. Our new camp lay on a rather steep naka field which was strewn with pools and flowers. Farther below in the valley, closer to the Tschürnong, we could see herds and tents. We, too, had been noticed down there, for a few hours after our arrival individual pairs of horsemen circled around us on the northern and western rise. We counted on communicating /326/ with the natives on the next day. But fate decreed otherwise.

Today at twelve noon we had a violent thunderstorm with hail, lightning and thunder. At eight in the evening another thunderstorm passed by north of us and at half past nine we were again in the midst of one. All the elements were let loose. One flash of lightning followed another, illuminating the jagged edge of the mountains round about. Thunder rumbled literally without ceasing for half an hour. The first fine rain was followed by hail, as usual. We were hit by hailstones the size of walnuts. Howling, the dogs crawled into the tents and under the chests. The horses, raving with pain, pulled at their ropes, became entangled in their chains and fell over each other. The entire troop of yaks which were leashed together seemed to be on the point of flight. We had all we could do to prevent a stampede. While this was going on we were being lashed by the pieces of ice that rained down on us. In between, the lightning bolts sounded like rifle shots when they struck nearby. It seemed never to end. The hail was followed by hard snow, and in the end the grains lay more than half a foot deep. Suddenly - what was that? A shot? A bullet had come through my tent in which a candle burned. Then another shot and another. "Y-i-i! h-u-u-u...! hu-u-u! Yi - i!" It was pitch dark. The valley meadow resounded with countless voices. "You cowards," one of the voices called down the slope, "we 'll shoot you all dead if you dare defend yourselves! Flee or croak! You Chinese curs!" - "We'll see who croaks first, dirty dogs!" my men called back. Aimlessly our shots whizzed into the darkness. Only a dozen shots were needed, and this storm also passed like a phantom. With a "Yi!" and a "Yu-u-u...!" we set out to investigate. The rascals had only dared come within 100 meters. That is as near to the camp as the stealthy traces led and there lay slow matches that had got wet.

A brisk west wind helped us keep a large campfire going the rest of the night, on which the kyang meat of the day before was cooked.

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unable to keep step with the caravan. On the next two days I saw 133
individual groups of riders through my field glasses. But none of them ventured to come close to us.

Our march now continued due north where there was a large white spot on the map on which "mighty mountain massif with perpetual snow" stood out in bold letters. Camp 36 (Plate LXVIII), 37 and 38 nestled at the foot of precipitous limestone mountains on which I collected carbon- (Culm) fossils (Phillipsia and Productus). To the west of us lay a high valley, many kilometers wide, filled with mud. Up on the peak of the limestone mountains, at an altitude of 4,500 meters, I found brooding, yellow Kasarka geese. It is difficult to imagine a 136
more uncomfortable place for this business of hatching. There was seldom a tiny plant to be seen in a rock crevice. Wherever there was a sheltered spot, a hollow, it was filled with snow. Why do only these birds come out of the mild Chinese lowlands summer after summer to breed and molt in these storm-tossed unfriendly heights? On the plain there are also many small birds living in hollows in the ground. I saw three or four different kinds. During the day they twitter and half sing and even at night I could often hear them peep. They live on seeds and insects. One of the most common birds was the Tibetan lark (Melanocorypha maxima). Besides these we also observed kites, eagles and vultures. All the other birds that we still saw on the Tschörnorg: cuckoos, gray doves, magpies, were left behind. As soon as the sun appears a few butterflies flit over the low grass, but always the same species. (1) There is an abundance of lesser fauna

1. Among others, the following were collected here: Papilio machaon-ladskensis Moore; Pap. tamerlanus Oberthür; Armandia thaidina Blanch; Aporia hippia-tibetana Gr.; Mesapia peloria Hew.; Melitaea didymaturanica Stgr.

but not a great variety of species. Spiders seem to be the most frequently-occurring insects, especially Laufspinnen. There are also a few species of flies and above all many wood-lice. Among beetles there are Karaben 12 millimeters long.

During this time the weather was very changeable. At Camp 36 132
a cloudless, starry sky spread over us so that it cooled off to minus eight degrees and thick hoar frost, a rarity in /329/ in these altitudes, covered the ground. At Camp 37 we once again had to put in a day of rest because we were enveloped in clouds all day and wet snow swirled about us. At noon a shaggy, strange dog appeared at the door

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133 pass. There were only a few brief, clear moments when the hard, stinging kernels of snow permitted our watering eyes to catch a glimpse of the wild landscape of the pass. At such moments the chaos of partially crumbled slabs and heaps of rock covering an ancient, tremendous glacier circle that had its mouth towards the north, was all the more imposing.

Nowhere in this Burkh' an Buda mountain range did I see areas of eternal snows. Although there is more precipitation here than down below in the Tsaidam basin, it cannot withstand the drying power of the sun.

The peaks around the Türketse pass are almost buried in mounds of slab and rubble and this illustrates the earlier, gradual recession of the glacier in this entire region.

821 "Haya! ien tshi da de ch'en ā!" "Alas! how very big is the ien tschi!" sighed the Chinese when they finally reached the top and sank down completely exhausted from the great exertion caused by the mire and the rarefied atmosphere. /8/ The idea that a particular type of gas, ien tschi, is very "big" on the heights of Tibet, and that this causes difficulty in breathing in the mountains, is widespread.

• 132 We were also quite painfully affected by the sudden low temperature (at noon it was still around the freezing point) together with the west wind that howled around our ears, especially after the warm July days in the lowlands. I was scarcely able to steady the metal eclimeter, and only shaky marks appeared on the damp, cold surface of the paper.

133 From the 4,815 meter Türketse pass the descent is very gradual toward the south. The entire southern slope of the great Tsaidam border range is buried under huge moraines. We Europeans call this mountain range by the collective term Burkh' an Buda; however, the natives, the Mongols, use this name for only one of the more prominent peaks that is to be found somewhat to the west of my route.

We were all happy that the notorious ascent into the Tibetan highland had been accomplished without losses, and there seemed to be no further difficulties in the way of leading the over-exerted animals to succulent pastures on that same day; for in the distance we saw the most inviting-looking green spots in the region of the Alang Nor. However, my four-footed friends were not to partake of a green meal on that day, although from that vantage point travel in Tibet looks so simple not only at home but often on the road itself. We found ourselves on a flat part of a southern slope, on rubble imbedded in sand that was completely soaked with the water of the summer rainy season. There was absolutely no plant covering or roots which might

T 492 together the hind legs at the ankles of a large part of the animals and all the valuable hybrid yaks, so that they would not sprawl apart. The heavily-laden animals with short, immovable legs looked like large chests that were being shoved across the ice from behind. On the subsequent marches the loss of oxen was considerable, although the T 484 Tibetans covered only 20 kilometers a day at the most. However, we were often obliged to climb over frozen naka fields and high moors and that winded the animals. We always set out extremely early, earlier than I had ever succeeded in getting my Chinese started. Dawn was just faintly beginning when the last herd of yaks was quitting the old camp. During the first days be hu and his riders stayed behind until my Chinese had brewed their tea and tied up their packs. Then with a boastful smile showed me how quickly they could take down their tents and pack them, how skilfully a Fan tse saddles his mount and fastens the most awkward bundle to the primitive pack saddle with a few knots only.

C 132 South of the Hwang Ho I found surprisingly much snow as compared with the northern part of my route. However, it was nowhere deep; a 10 centimeter covering is very ample for this region. There was snow over a foot deep only in the numerous holes, in the dried-out pools and basins of the naka moors, which here play a more important role in the growth of vegetation than in the north. At that time it was always very misty, too. Visibility was so limited that one could often not see ahead more than one kilometer. The west wind had lost considerable force and as a result /115/ we did not suffer so much from cold. But at night the temperature always sank to at least -26°.

C 133 On February 11 we were obliged to cross a high, steep moraine 2 kilometers wide, where round granite boulders many cubic meters in size jutted out between reddish, loose sand. This mound is - so far as I was able to survey its gigantic proportions in the prevailing fog and mist - the left lateral moraine of an erstwhile glacier projection that extended over 100 kilometers from west to east. From it one reaches the broad Wa Yung or Tsa ge Yung, a plain running east and west, which harbors a small stream that later flows into the Re Tschü. The latter joins the Ser Tschü and, in the country of the Horkurma, finally flows along the wide swamp valley that is known by the Tibetans as the Re Chü warma, i.e., mouth of the Re Chü (mountain water) into the Hwang Ho. At the place where we crossed it the Wa Yung was over four kilometers wide and formed a precious grassy plain that had 000 been touched only by kyang, antilopes and wild yaks. Here, from

floors of on an average 2, 900-2, 700 meters high. 000

Even toward the end of September it was very rainy in and around Tao tschou. The precipitation remained within modest amounts but the sky was usually overcast. This was probably the reason why the night temperatures were not yet low and, in spite of the 2, 760 meter altitude, hovered between +2° and +6°, whereas at noon the air warmed up at various times to more than +10°. As a rule there was almost no wind on the ground. The rain clouds came from the southeast or the west. On September 16 in the early morning we had snow with a gentle east wind and a westerly drift of clouds and only on the nineteenth, twentieth and twenty-first I noted thunderstorms in my meteorological diary. All three thunderstorms came from the west. September 24 when I said farewell to Tao tschou and its hospitable Americans, was a day of rain so that the animals slipped on the sticky loam earth and the pack animals were hardly able to make any progress. Mr. Ruhl accompanied me on the first two marches. So at first I had to say goodbye to Mrs. Ruhl, my extremely gracious and pretty hostess and her little baby. Even though the mission house in Tao tschou presented a very good and neat appearance - everywhere the guiding hand of the practical American woman was to be felt - nevertheless for a woman of our Western culture residence in the city must have been torture. Year in and year out one hears about nothing but war and pillage here, and the missionary work bears occasional fruit only among the Chinese and the widowed or lonely old Chinese women. Tangible success in mission work among Tibetans and Mongols is not to be thought of, of course, because of the omnipotence of the lamas. Besides, the European also battles the severe highland climate and the homesickness that comes from this seclusion from the world. In the summer of 1907 there was an imperial Chinese postoffice installed, but because of lack of other interests it was only obliged to forward missionaries' letters and every tenth day a messenger arrived who delivered mail that had been en route six weeks from Hsingan fu. As in Hsining fu, the population is frequently afflicted with diphtheria, scarlet fever and smallpox. Typhus and syphilis of course also reap large harvests and among the lung diseases of the region asthma plays an important role. A large percentage of the missionaries contracted smallpox. Mr. Simpson had acquired pock marks up there in carrying out his profession. A missionary who had just come up from the coast where he had been freshly vaccinated, died shortly before my arrival, of variola.

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